Evolution of Cooperation on Anonymous Markets
Reputation, Reciprocity and the Emergence of Institutions

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"VW-BUS IN TOP-CONDITION, NO ACCIDENTS, FEW KILOMETERS..."

Trust problem ?

Süddeutsche Zeitung vom 19.1.2007 “Abgezockt im Internet. Kein Betrug mehr, sondern schon Geschäftsmodell.” (Probably invented example.)

Bad luck if it happens after payment!

FOTO: ISTOCKPHOTO

Süddeutsche Zeitung
vom 19.1.2007

Japan

Hilfe, mein Pudel ist ein Schaf

Würden Sie den Unterschied zwischen einem Schaf und einem Pudel erkennen? Viele Japaner offensichtlich nicht: Eine Betrügerbande hat sich diese Unwissenheit jetzt zunutze gemacht.

Von Beate Wild Südd. Zeitung, 27.4.2007

Help, my poodle is a sheep! Would you recognize the difference between a sheep and a poodle? According to German newspapers many Japanese people never came in contact with these animals. A criminal gang in Japan exploited the lack of knowledge and sold sheeps for poodles. Maiko Kawakami, Japanese actor, became a prominent victim of the fraudsters.

Cooperation problem on anonymous markets

- Non-repeated interactions of anonymous actors
- Asymmetric information: Both, sellers and buyers have a trust problem
- Emergence of institutions to solve for trust problems
- Elements of the system are 1. payment rules, 2. the reputation and feedback system
- “Natural experiment” for the evolution of cooperation if the “shadow of the future” is replaced by reputation or “the shadow of the past”

Two questions:

1. Mixed evidence for the hypothesis of “a premium for reputation”. a) Is there an effect of reputation on price? b) Is the effect larger for used products?

   One needs homogeneous goods to test for this hypothesis. Also, we have a new and large data set collected from German eBay auctions: 13044 mobile phone offers.

2. High participation in the feedback system is a collective good. There is the problem of the erosion of the feedback system by freeriding. Why does a large proportion of actors cooperate? Is there altruistic or strategic reciprocity?

   Data: 177561 transactions of DVDs, eBay Germany.

How to solve a seller's trust problem?

Constraint: In auctions, seller normally cannot choose their interaction partner

Sellers protect themselves by choosing a trust game with the buyer in the role of a trustor and the seller in the role of a trustee. Payment rule: cash in advance or cash on delivery.

Choice of institution such that a seller has the "first mover advantage"

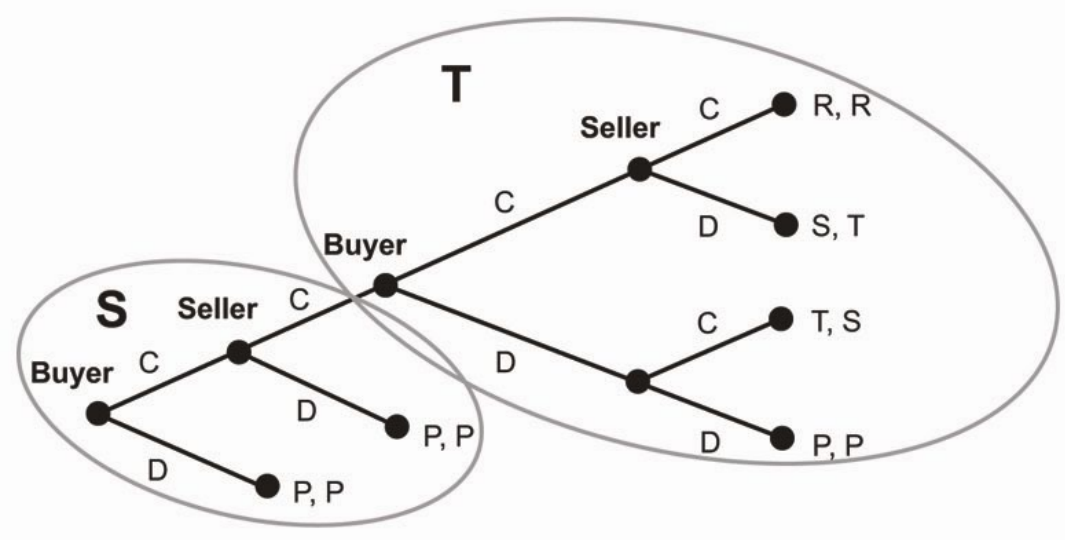
Seller determines mode of payment and the higher the reputation, the more she can exert her power to determine favourable payment conditions (data from Ricardo-CH)

Mode of payment	**Number**	**Per cent**	**Symmetric/ asymmetric**	**Rank order of asymmetry in favour of seller**	**Reputation arithmet. mean (Median)**
Payment in advance	47	25.1	asymmetr. in favour of seller	4	22.04 (6.0)
Cash on delivery	131	70.1	asymmetr. in favour of seller	3	9.87 (5.0)
Buyer collects on delivery of cash payment	6	3.2	symmetric	2	1.67 (0.0)
Seller delivers on receipt of cash payment	2	1.1	symmetric	1	-
Seller delivers by mail. Buyer pays to account	1	0.5	asymmetr. in favour of buyer	0	-
Credit card	0	0	-	-	-
Total	187	100.0			

Simplified game structure:

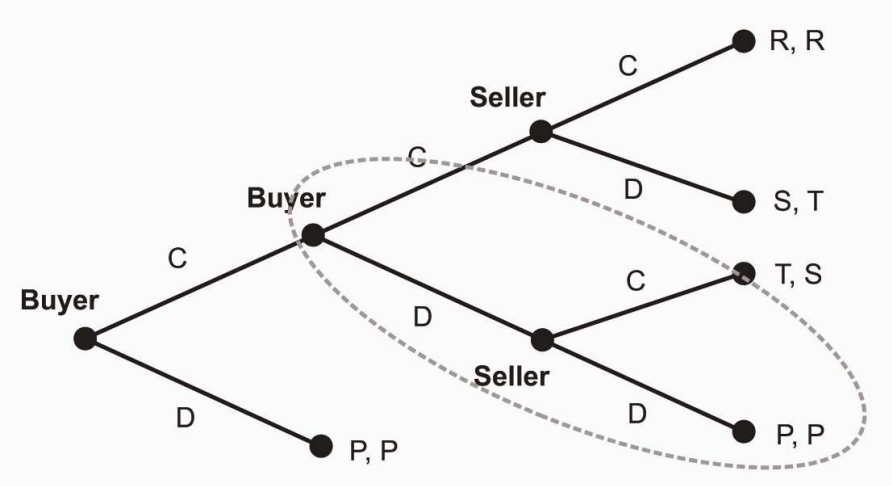
Two problems:

1. Selection problem: Buyer has to choose seller.
   - C = Buyer chooses seller/ seller accepts buyer
   - D = Buyer rejects seller's offer
2. Transaction problem: Seller has to exchange good for money.
   - C = Buyer pays in advance/ seller delivers a quality good.
   - D = Buyer refuses to pay/ seller does not deliver the product.



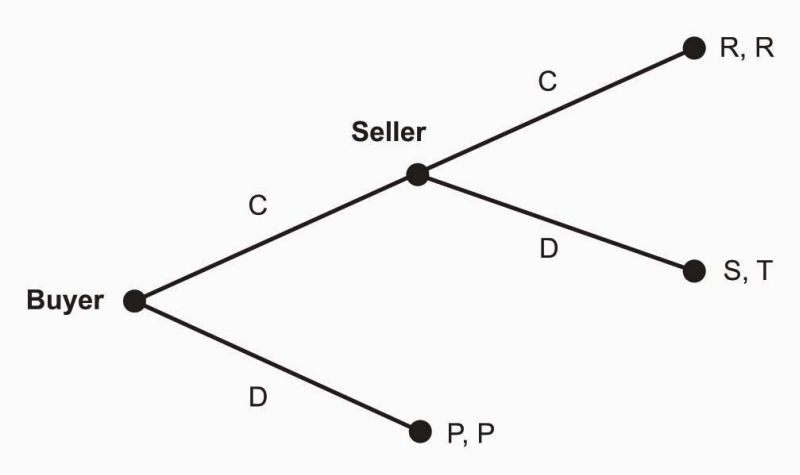
Seller determines type of game: Sequential PD with buyer's move first ("second-mover advantage").

Combination of: (1) selection problem and (2) transaction problem



To simplify, remove buyer's option to defect after selection of seller:

⇨ Trust Game



Effect of Reputation on Prices

	New products				Used products			
Log positive ratings	**1.091**	***	**1.110**	***	**1.253**	***	**0.874**	***
Log negative ratings	**-1.370**	*	**-1.919**	***	**-2.469**	***	**-2.661**	***
Previous interaction (0/1)			**-2.394**				**5.970**	***
Starting price			0.040	***			0.138	***
Auction duration (in days)			0.202				-0.134	
Calendar time (centered)			-0.262	***			-0.230	***
No. of bidders			0.636	***			1.540	***
Competition (other offers)			-0.097	***			-0.091	***
Auction ended on a Sunday			-4.325	***			-0.029	
Picture			3.245	*			4.243	**
Listing with thumbnail			2.175	***			3.125	***
Listing in bold			0.894				3.191	**
Log description length			0.808	***			2.835	***
Product dummy variables	[...]	***	[...]	***	[...]	***	[...]	***
Constant	235.179	***	225.789	***	215.054	***	173.702	***
Adj. R-squared	0.817		0.843		0.757		0.786	
No. of cases	4875		4875		8169		8169	

Notes: German eBay mobile phone market, 1.12.04 – 7.1.05; Dependent variable: Selling price (EUR). * p<.05, ** p<.0, *** p<.001 (adjusted for clustering on sellers).

Effect of Reputation on Prices

	New products				Used products			
Log positive ratings	**1.017**	***	**1.244**	***	**1.316**	***	**1.197**	***
Log negative ratings	**-1.216**	*	**-2.042**	***	**-2.482**	***	**-3.027**	***
Previous interaction (0/1)			**-2.968**	*			**2.518**	*
Log buyer score			-1.017	***			-0.985	***
Starting price			0.0125	*			0.0580	***
Auction duration (days)			-0.0096				-0.142	
Calendar time (centered)			**-0.305**	***			**-0.252**	***
Calendar time squared			**0.0225**	***			**0.0256**	***
Competition (other offers)			**-0.117**	***			**-0.0867**	***
Product picture			3.705	**			4.818	**
Listing with thumbnail			2.251	***			4.053	***
Bold listing			1.070				2.833	**
Log description length			1.048	***			2.740	***
Constant	236.4	***	235.5	***	215.1	***	193.2	***
Product dummy variables	Yes		Yes		Yes		Yes	
Adjusted R^2	0.810		0.838		0.758		0.781	
Observations	5096		5096		8306		8306	

Notes: German eBay mobile phone market, 1.12.04 – 7.1.05; Dependent variable: Selling price (EUR). * p<.05, ** p<.0, *** p<.001 (adjusted for clustering on sellers).

- Giving feedback: Freerider problem
- Erosion of rating system?
- Similar to “voting paradox”

Why do actors contribute to the collective good?

- Low cost decision
- Reciprocity norm (altruistic reciprocity)
- Strategic decision

Proportional Hazards Models for Submitting (Positive) Feedback

	Sellers			Buyers		
Buyer first	**1.706**	***	**(0.112)**			
Seller first				**0.616**	***	**(0.011)**
Buyer on seller's list	**-0.359**	***	**(0.070)**	**0.237**	***	**(0.055)**
Seller on buyer's list	-0.016		(0.096)	**-0.566**	***	**(0.063)**
Seller reputation score	0.366	***	(0.072)	-0.060	***	(0.008)
Seller reputation squared	-0.041	***	(0.007)	0.007	***	(0.001)
Power seller	0.193		(0.161)	-0.023		(0.016)
Seller ID Verified	0.318	*	(0.157)	0.018		(0.016)
Seller buying activity (0/1)	0.264	***	(0.067)			
Buyer reputation score	0.094	***	(0.012)	0.285	***	(0.017)
Buyer reputation squared	-0.010	***	(0.001)	-0.026	***	(0.002)
Buyer ID Verified	0.040		(0.045)	0.319	***	(0.046)
Buyer selling activity (0/1)				0.212	***	(0.035)
Price	0.004		(0.002)	-0.000		(0.000)
"New" in title	0.021		(0.052)	-0.054	***	(0.011)
Picture	0.021		(0.102)	0.045	**	(0.014)
No. of cases	152939			152939		
No. of clusters	27421			88951		

Notes: German eBay DVD market, 1.12.04 – 7.1.05; Bootstrap SE in parentheses (adjusted for clustering); All reputation scores in logarithms; * p<.05, ** p<.0, *** p<.001

Proportional Hazards Models for Submitting (Positive) Feedback

	Sellers		Buyers	
Other rated first	**2.018** ***	**(0.115)**	**0.720** ***	**(0.00868)**
Rating from previous interaction	**-0.281** ***	**(0.0755)**	**-0.468** ***	**(0.0331)**
Hybrid actor	**0.177** **	**(0.0582)**	**0.187** ***	**(0.0196)**
Positive seller score (log)	0.0481 **	(0.0155)	0.0761 ***	(0.00357)
Negative seller score (log)	-0.201 ***	(0.0269)	-0.0912 ***	(0.00499)
Seller has Verified Identity	0.211 *	(0.0867)	0.116 ***	(0.0141)
Seller has Me-Page	0.165 **	(0.0629)	0.0282 *	(0.0127)
Positive buyer score (log)	0.0383 ***	(0.00427)	0.139 ***	(0.00368)
Negative buyer score (log)	-0.0902 ***	(0.0112)	-0.252 ***	(0.0102)
Buyer has Verified Identity	-0.0427	(0.0501)	0.190 ***	(0.0374)
Buyer has Me-Page	-0.0945 ***	(0.0260)	0.0434	(0.0284)
Selling price	-0.00164	(0.00128)	-0.000382	(0.000312)
Description length (log)	-0.00672	(0.0162)	-0.0203 ***	(0.00303)
Listing as new	-0.107	(0.0589)	0.00595	(0.00924)
Listing in bold	-0.202	(0.136)	-0.165 **	(0.0559)
Payment is PayPal or credit card	0.0792	(0.0506)	0.0203	(0.0107)
Observations (Clusters)	177561	(29816)	177561	(99139)
Events	146693		146300	

Notes: German eBay DVD market, 1.12.04 – 7.1.05; Bootstrap SE in parentheses (adjusted for clustering); All reputation scores in logarithms; * p<.05, ** p<.0, *** p<.001

Empirical analysis of auction data shows:

1. Buyers pay for reputation („premium“ on reputation).
2. Negative reputation has a strong impact if there is high uncertainty.
3. Sellers have an incentive to invest in reputation, i.e. to behave cooperatively.
4. Sellers choose payment mode („second mover advantage“)
5. Reciprocity supports feedback
6. Simple institutional setting to ensure cooperation! Emergence of institutional rules: 1. Payment, 2. shipping the product in quality advertised, 3. buyer‘s feedback, 4. seller‘s feedback.
7. Problems: Strategic use of the rating system! Inflation of positive ratings. Building up fake reputations!

- Given a) transparency (all actors have access to the rating histories), b) high participation in rating, and c) the traded goods or services are “inspection goods” a decentralized reputation system is a very simple and effective mechanism to achieve cooperation.
- Diffusion of Reputation mechanisms. For example, new products, books, second-hand car dealers, lawyers, dentists, cardiologists,teachers, professors (www.meinprof.de) ... ►„Reputation Society“?